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CONTINUITY OF ALGAL BIOMARKERS FROM THE LATE CRETACEOUS THROUGH THE PALEOCENE IN SEDIMENTS FROM HIGH SOUTHERN LATITUDES IN THE TRANSKEI BASIN (IODP SITE U1581)

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The distributions and isotopic compositions of biomarkers in marine sediments serve as diagnostic indicators of sources of organic matter (OM). Hence, their stratigraphic profiles are employed extensively to elucidate temporal changes in paleoenvironments and paleoclimate. Similarly, consistencies in molecular compositions provide evidence that OM sources and processes governing biomarker preservation likely remained uniform over time. Investigation of a sequence of Campanian to Paleocene (~76-60 Ma) sediments (***Fig. 1A***) recovered during IODP Expedition 392 from the Transkei Basin (Site U1581), offshore South Africa, [1] reveals a temporal coherence in algal biomarker compositions from the Cretaceous through the Paleogene. The occurrence of suites of C_{37}-C_{40} alkenones derived from haptophyte algae [2] expands their Cretaceous paleogeographic range [3-6] to southern high latitudes (~58°S). Similarities in alkenone profiles for Maastrichtian and Danian samples (***Fig. 1B***) suggests conformity in their haptophyte source(s). Moreover, the dominant series of steroidal hydrocarbons in Campanian through Paleocene sediments from the Transkei Basin are C_{27} to C_{29} D^4- & D^5-sterenes and $D^{4,22}$- & $D^{5,22}$-steradienes plus subordinate amounts of 5a- & 5b-steranes (***Fig. 1C***; [7-11]). The distributions of C_{27}, C_{28}, and C_{29} steroids can be represented on a ternary diagram (***Fig. 1C***; [12]), which reveals discrete distributions for different suites of steroidal hydrocarbons but similarity among their individual series. In particular, the coherent dominance of C_{28} steradienes, reflecting algal sources of OM, indicates temporal uniformity in phytoplankton producers, which is echoed by the consistent distributions of tocopherols from photosynthetic organisms and 4-methylsteroids from dinoflagellates. Thus, the evidence from biomarker distributions attests to the survival of their algal sources at high southern latitudes from the Cretaceous to the Paleogene.

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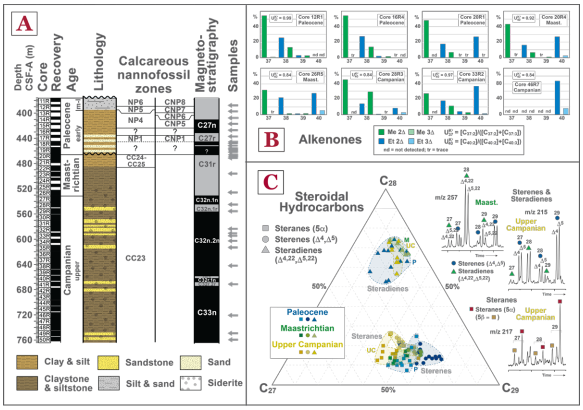

Fig. 1: **A.** Core recovery, lithology, bio- and magnetostratigraphy for Upper Campanian to Paleocene section of Site U1581B (IODP Expedition 392) in the Transkei Basin. 30 samples were extracted for biomarker analyses. **B.** Histograms of alkenone distributions in eight samples including the oldest occurrence (Core 46R7). $U^{K'}_{37}$ and $U^{K'}_{38}$ values are calculated for those samples where C_{37} or C_{38} alkatrienones could be integrated. The uniformity of distributions in cores 20R1 (Paleocene) and 20R4 (Maastrichtian) show continuity of alkenones between these time intervals. **C.** Ternary diagram illustrating the relative proportions of C_{27}, C_{28} & C_{29} components for individual steroid series (steranes, sterenes, steradienes) showing similarities in their distribution for Paleocene, Maastrichtian, and Upper Campanian samples. Each series is designated by distinct shapes & colors and shaded fields corresponding to separate time intervals. Partial mass chromatograms depicting distributions of steroidal hydrocarbon series: m/z 215 & m/z 257 profiling Δ^4 & Δ^5-sterenes and $\Delta^{4,22}$ & $\Delta^{5,22}$-sterenes; m/z 217 showing 5α- & 5β-steranes. These ions aided calculation of relative abundances of C_{27}, C_{28} & C_{29} components.